

S/N Unknown

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Ralf Ehricht et al.

Examiner: Unknown

Serial No.: Unknown

Group Art Unit: Unknown

Filed: Herewith

Docket: 235.022US1

Title: MICROCHIP MATRIX DEVICE FOR DUPLICATING AND
CHARACTERIZING NUCLEIC ACIDS

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Prior to examination, please amend the above-identified continuation application as follows.

In the Specification

On page 1, after the title, please add the following section:

--RELATED APPLICATIONS

This application is a continuation-in-part under 35 USC 111(a) of International Application No. PCT/EP00/06103, filed in German on June 30, 2000 and published as WO 01/02094 A1 on January 11, 2001, which claimed priority under 35 U.S.C. 119 from German Application No. 199 32 423.9, filed July 2, 1999, which applications are incorporated herein by reference.--

In the Claims

Please substitute the claim set in the appendix entitled Clean Version of Pending Claims for the previously pending claim set. The substitute claim set is intended to reflect amendment of pending claims 4, 6, 8-12, 14, 15, 17, 19, 20, and 23. The specific amendments to individual claims are detailed in the following marked up set of claims.

1. (Unchanged) Device for duplicating and characterizing nucleic acids in a reaction chamber, characterized in that a chamber body (1) containing an optically permeable chip (2) having a detection area (12), and being optically permeable at least in the zone of the detection area (12) of the chip (2), is sealingly placed on an optically permeable chamber support (5), so that a

sample chamber (3) having a capillary gap (7) is formed between the chamber support (5) and the detection area (12) of the chip (2), which is temperature-adjustable and flow-controllable.

2. (Unchanged) Device according to claim 1,

characterized in that the temperature adjustment means are connected with the chamber support (5) and permit a rapid heating and/or cooling of the sample chamber (3) having the capillary gap (7).

3. (Unchanged) Device according to claim 2,

characterized in that the temperature adjustment means are situated on the side of the chamber support (5) facing towards the chamber body (1).

4. (Once Amended) Device according to [any one of the preceding claims]

claim 1,

characterized in that the temperature adjustment means (16, 17) are configured in the form of optically transparent thin films and/or are so finely structured that the optical transparency of the chip (2) remains unaffected at least in the zones of the spots (13) of the detection area (12).

5. (Unchanged) Device according to claim 4,

characterized in that the temperature adjustment means comprise micro-structured heating elements (17), preferably nickel-chromium thick film resistance heaters and/or microstructured temperature sensors (16), preferably nickel-chromium thick film resistance sensors.

6. (Once Amended) Device according to [any one of the preceding claims]

claim 1,

characterized in that the chamber support (5) comprises systems for thoroughly mixing the liquid sample, which are configured in the form of optically transparent thin films and/or are so finely structured that the optical transparency of the chip (2) remains unaffected at least in the zones of the spots (13) of the detection area (12), whereby preferably a quadrupole system for inducing an electro-osmotic flow is concerned.

7. (Unchanged) Device according to claim 6,
characterized in that the quadrupole system is realized as gold-titanium electrodes.

8. (Once Amended) Device according to [any one of the preceding claims]
claim 1,
characterized in that the chamber support (5) and the chamber body (1) preferably consist of
glass and/or synthetic material and/or optically permeable synthetic materials particularly
preferred of nylon, Teflon, topaz, polycarbonate, polystyrene, PMMA and/or polymethane ethyl
acrylate.

9. (Once Amended) Device according to [any one of the preceding claims]
claim 1,
characterized in that the chamber support (5) consists of a thermally conducting material.

10. (Once Amended) Device according to [any one of the preceding claims]
claim 1,
characterized in that the chip consists of optically permeable materials, preferably of glass,
borofloat glass, quartz glass, monocrystalline CaF₂, sapphire, PMMA and/or silicon.

11. (Once Amended) Device according to [any one of the preceding claims]
claim 1,
characterized in that the chamber body (1) comprises, at least in the zone of the chip (2) an
optically permeable conical recess.

12. (Once Amended) Device according to [any one of the preceding claims]
claim 1,
characterized in that the chamber body disposes of an inlet (81) and an outlet (82) spatially
separate from each other, for charging the sample chamber (3) and the capillary gap (7).

13. (Unchanged) Device according to claim 12,
characterized in that the inlet (81) and the outlet (82) are arranged unilaterally to the chip (2) and
are separated by a gas reservoir nose (9).

14. (Once Amended) Device according to [any one of the preceding claims]
claim 1,

characterized in that the chamber body (1) is sealingly and unreleasably connected with the
chamber support (5) by an adhesive and/or weld connection, or is releasably connected through
an additional sealing surface (43).

15. (Once Amended) Device according to [any one of the preceding claims]
claim 1,
characterized in that the detection area (12) is configured in the form of spots, onto which probes
(56, 57, 58, 59) in the form of nucleic acid molecules are immobilized, said nucleic acid
molecules preferably being DNA molecules and/or RNA molecules.

16. (Unchanged) Device according to claim 15,
characterized in that the probes (56, 57, 58, 59) are immobilized through spacers (55).

17. (Once Amended) Device according to [any one of claims 1 through 14]
claim 1,
characterized in that the detection area (12) is configured in the form of spots, onto which probes
(56, 57, 58, 59) in the form of peptides and/or proteins are immobilized, preferably antibodies,
receptor molecules, hormones and/or pharmaceutically active peptides being concerned.

18. (Once Amended) Device according to [any one of the preceding claims]
claim 1,
characterized in that the evaluation of the chip-based characterization may ensue by forms of the
optical detection and/or spectroscopy, particularly preferred by transmitted-light fluorescence
measurement, dark field fluorescence measurement, confocal fluorescence measurement,

reflected-light fluorescence measurement, photometry and/or differential photometry.

19. (Once Amended) Device according to [any one of claims 1 through 17] claim 1, characterized in that the evaluation of the chip-based characterization ensues by a silver precipitation reaction.

20. (Once Amended) Use of a device according to [any one of the preceding claims] claim 1 for an almost simultaneous performance of reprocessing reactions and/or conditioning reactions and a chip-based characterization of the products.

21. (Unchanged) Use of a device according to claim 20, the reprocessing reaction and/or conditioning reaction concerning an amplification of nucleic acids by PCR.

22. (Unchanged) Use of a device according to claim 20, the reprocessing reaction and/or conditioning reaction concerning a reverse transcription of RNA to cDNA.

23. (Once Amended) Use of a device according to [any one of claims 1 through 17] claim 1, the reprocessing reaction and/or conditioning reaction concerning a digestive process of nucleic acids by means of restriction enzymes.

24. (Unchanged) Use of a device according to claim 20 for the almost simultaneous amplification of DNA by PCR and for the chip-based characterization of the PCR products.

Remarks

The specification has been amended to add to page 1 a section titled --RELATED APPLICATIONS--, citing priority to the parent International Application and to the prior German application.

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The claims have been amended to delete multiple dependencies. These amendments are made solely to reduce the filing fee and are not made for purposes of patentability as discussed in *Festo v. Shoketsu Kinzoku Kogyo Kabushiki Co.* 72 F.3d 558 (Fed. Cir. 2000).

Claims 1-24 are pending.

The Examiner is invited to telephone the undersigned attorney at 612-349-9587 if there are any questions concerning this application, or if prosecution may be assisted thereby.

Respectfully submitted,

RALF EHRICHT ET AL.

By their Representatives,

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1/2/02

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Date of Deposit: January 2, 2002

This paper or fee is being deposited on the date indicated above with the United States Postal Service pursuant to 37 CFR 1.10, and is addressed to the Commissioner for Patents, Box Patent Application, Washington, D.C. 20231.

CLEAN VERSION OF PENDING CLAIMS

1. (Unchanged) Device for duplicating and characterizing nucleic acids in a reaction chamber, characterized in that a chamber body (1) containing an optically permeable chip (2) having a detection area (12), and being optically permeable at least in the zone of the detection area (12) of the chip (2), is sealingly placed on an optically permeable chamber support (5), so that a sample chamber (3) having a capillary gap (7) is formed between the chamber support (5) and the detection area (12) of the chip (2), which is temperature-adjustable and flow-controllable.

2. (Unchanged) Device according to claim 1, characterized in that the temperature adjustment means are connected with the chamber support (5) and permit a rapid heating and/or cooling of the sample chamber (3) having the capillary gap (7).

3. (Unchanged) Device according to claim 2, characterized in that the temperature adjustment means are situated on the side of the chamber support (5) facing towards the chamber body (1).

4. (Once Amended) Device according to claim 1, characterized in that the temperature adjustment means (16, 17) are configured in the form of optically transparent thin films and/or are so finely structured that the optical transparency of the chip (2) remains unaffected at least in the zones of the spots (13) of the detection area (12).

5. (Unchanged) Device according to claim 4, characterized in that the temperature adjustment means comprise micro-structured heating elements (17), preferably nickel-chromium thick film resistance heaters and/or microstructured temperature sensors (16), preferably nickel-chromium thick film resistance sensors.

6. (Once Amended) Device according to claim 1, characterized in that the chamber support (5) comprises systems for thoroughly mixing the liquid sample, which are configured in the form of optically transparent thin films and/or are so finely structured that the optical transparency of the chip (2) remains unaffected at least in the zones of the spots (13) of the detection area (12), whereby preferably a quadrupole system for inducing an electro-osmotic flow is concerned.

7. (Unchanged) Device according to claim 6, characterized in that the quadrupole system is realized as gold-titanium electrodes.

8. (Once Amended) Device according to claim 1, characterized in that the chamber support (5) and the chamber body (1) preferably consist of glass and/or synthetic material and/or optically permeable synthetic materials particularly preferred of nylon, Teflon, topaz, polycarbonate, polystyrene, PMMA and/or polymethane ethyl acrylate.

9. (Once Amended) Device according to claim 1, characterized in that the chamber support (5) consists of a thermally conducting material.

10. (Once Amended) Device according to claim 1, characterized in that the chip consists of optically permeable materials, preferably of glass, borofloat glass, quartz glass, monocrystalline CaF_2 , sapphire, PMMA and/or silicon.

11. (Once Amended) Device according to claim 1, characterized in that the chamber body (1) comprises, at least in the zone of the chip (2) an optically permeable conical recess.

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18. (Once Amended) Device according to claim 1,
characterized in that the evaluation of the chip-based characterization may ensue by forms of the
optical detection and/or spectroscopy, particularly preferred by transmitted-light fluorescence
measurement, dark field fluorescence measurement, confocal fluorescence measurement,
reflected-light fluorescence measurement, photometry and/or differential photometry.

19. (Once Amended) Device according to claim 1,
characterized in that the evaluation of the chip-based characterization ensues by a silver
precipitation reaction.

20. (Once Amended) Use of a device according to claim 1 for an almost
simultaneous performance of reprocessing reactions and/or conditioning reactions and a chip-
based characterization of the products.

21. (Unchanged) Use of a device according to claim 20, the reprocessing reaction
and/or conditioning reaction concerning an amplification of nucleic acids by PCR.

22. (Unchanged) Use of a device according to claim 20, the reprocessing reaction
and/or conditioning reaction concerning a reverse transcription of RNA to cDNA.

23. (Once Amended) Use of a device according to claim 1, the reprocessing
reaction and/or conditioning reaction concerning a digestive process of nucleic acids by means of
restriction enzymes.

24. (Unchanged) Use of a device according to claim 20 for the almost simultaneous
amplification of DNA by PCR and for the chip-based characterization of the PCR products.